**U. S. DEPARTMENT OF ENERGY**
**WORK BREAKDOWN STRUCTURE DICTIONARY**
**PART II - ELEMENT DEFINITION**

| 1. PROJECT TITLE/PARTICIPANT<br>Environmental Management/Paducah Remediation Services, LLC (PRS) | 2. DATE<br>06/29/07 | 3. IDENTIFICATION SITE<br>Paducah Project DOE Portsmouth/Paducah Project Office (PPPO) |
|---|---|---|
| 4. WBS ELEMENT CODE<br>04.11.10.03 | 5. WBS ELEMENT TITLE<br>Outyear Southwest Plume | |
| 6. INDEX LINE NO.<br>N/A | 7. REVISION NO. AND AUTHORIZATION<br>Rev 1 | 8. DATE<br>02/22/08 |
| 9. APPROVED CHANGES<br>N/A | | |
| 10. SYSTEM DESIGN DESCRIPTION<br>N/A | 11. BUDGET AND REPORTING NUMBER<br>N/A | |

**12. ELEMENT TASK DESCRIPTION**

**THIS IS A PLANNING LEVEL WBS DICTIONARY**

**WBS STRUCTURE**

The scope of this element includes the following subelements:

- WBS 04.11.10.03.01 Southwest Plume Subproject Management
- WBS 04.11.10.03.02 C-Sparge Remedial Action
- WBS 04.11.10.03.03 Remedial Action Completion Report
- WBS 04.11.10.03.05 Remedial Design Report
- WBS 04.11.10.03.06 Remedial Action Work Plan
- WBS 04.11.10.03.07 Feasibility Study
- WBS 04.11.10.03.08 Proposed Plan
- WBS 04.11.10.03.09 Record of Decision
- WBS 04.11.10.03.10 Remedial Design Work Plan

**INTRODUCTION**

In 1988, widespread contamination of groundwater by trichloroethylene (TCE) and technetium-99 (Tc-99) around the Paducah Gaseous Diffusion Plant (PGDP) was detected. In 1993, an engineering evaluation cost estimate was approved and established the water policy to protect the public from use of impacted groundwater by supplying public water. In 1995 and 1997, interim measures were taken to contain the high concentration areas of the Northwest and Northeast Plumes. The interim measures included installation of two groundwater pump and treatment systems, one each at the Northwest and Northeast plumes. Subsequently, remedial investigations were performed to further define the extent of groundwater contamination at PGDP. Results of these investigations detected the presence of dense nonaqueous phase liquid (DNAPL) on-site and up to dissolved-phase plumes (northeast, northwest, and southwest) outside the facility fenceline. As a result of the remedial investigations and baseline risk assessment performed for the Groundwater Operable Unit (GWOU), the following groundwater problem statements have been developed.

- TCE exists as DNAPL in three main areas: C-400 Building, C-720 Building, and C-474-C Oil Landfarm. This organic compound is found in both the Upper Continental Recharge System (UCRS) and the Regional Gravel Aquifer (RGA) at the C-400 Building and in the UCRS at the C-720 Building and C-474-C Oil Landfarm. The mass of TCE in these areas must be reduced, removed, or contained before it is possible to return the groundwater back to beneficial use.
- Dissolved-phase TCE and Tc-99 appear to be discharging to surface water in Little Bayou Creek in the off-site area. These releases may need to be contained or eliminated to remove direct contact risks to human health and the environment.

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To address these problems, DOE has developed a remedial strategy for PGDP to stop plume growth and migration of contaminants and to reduce the toxicity and volume of contaminants. The strategy includes employing various technologies as an early action, source area actions, fenceline actions, off-site plume actions, and institutional control action. The Southwest Plume/Sources is a source action for the C-720 Building and SWMU 1 sources. The SWMU 4 source that results in the SW Plume will be remediated as necessary by the Burial Grounds Operable Unit.

## LOGIC RELATIONSHIPS

**Interfaces:**

Internal to Contractor

- All contractor project managers and staff
- All subcontractors

External to Contractor

- U.S. Department of Energy (DOE) PPPO and support contractors
- DOE Headquarters or other DOE sites (if applicable)
- U.S. Environmental Protection Agency (EPA)
- Commonwealth of Kentucky (KY)
- Site tenants including United States Enrichment Corporation (USEC); Uranium Disposition Services, LLC; and Swift & Staley Team (SST)
- USEC services in the area of property, information technology, radios, etc.
- SST, particularly in the areas of property management, information technology, and security.
- Nevada Test Site (NTS): Profiling and disposition of newly generated and classified and fissile low-level waste (LLW), if required or applicable.
- Energy*Solutions*: Profiling, treatment, and disposition of mixed and LLW, if required or applicable.
- Toxic Substances Control Act (TSCA) Incinerator, if required or applicable.
- Commercial treatment, storage, or disposal (TSD) Facility: For treatment and disposal of non radioactive hazardous waste, if required or applicable.
- Stakeholders
- Citizens Advisory Board and supporting contractor Edward Holmes, Inc. (EHI).
- DOE Integrated Safety Management System (ISMS) Verification Team
- Other nonregulatory key interfaces

**Time Sequencing with Other Work:**

- The GWOU feasibility study, performed under separate WBS, identified and evaluated technology alternatives to remediate primary and secondary source areas, and dissolved-phase plume areas.
- Proposed Plans (PPs) and Records of Decision (RODs) are completed as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process before proceeding with remedial design and remedial action subproject tasks.
- Remedial designs and other decision documents must be complete before proceeding with the construction and operation of the selected remedy for remedial action.

## SCOPE DESCRIPTION

The objective of this subproject is to procure a contractor and perform a CERCLA cleanup for the

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Southwest Plume and for ultimate remediation to levels that are protective of human health and the environment. The GWOU consists of the groundwater plumes on-site and off-site and any sources associated with the plumes. The second component of this element is the development of the Remedial Action Completion Report for this remedial action.

The assumed action for the Southwest Plume is the implementation of the three C-Sparge treatment units in the area of the plume near the PGDP fenceline. This action will be documented under CERCLA decision documents being performed in the Southwest Plume WBS element.

**WBS 04.11.10.03.01 Southwest Plume Subproject Management**

Provide overall management activities associated with this subproject. Activities performed under this subelement include the following:

- Perform technical, contractual, and project functions necessary to effectively manage and report scope, schedule, and budget.
- Manage and transmit required documents to the Administrative Record.
- Maintain all activities within the defined safety, environmental, and quality requirements.
- Perform technical and personnel management functions.
- Maintain technically qualified and properly trained personnel.
- Develop, evaluate, and report project performance metrics.
- Interface with DOE, KY, EPA, other prime contractors, and stakeholders, as needed.

The method(s) used for determining earned value for this WBS element is Level of Effort.

**WBS 04.11.10.03.02 C-Sparge Remedial Action**

This element will include the actual construction and operation of the remedial measure selected for the Southwest Plume. Efforts will include the procurement phase, construction, shake-down, operations and demobilization phases. A verification phase to the remedial action will not be necessary to determine if the remedial measure is complete since the remedial measure is a long-term remediation utilizing C-Sparge technology.

The major components of the remedial action will include the following:

- Procure a specialty contractor to implement the C-Sparge remedial action in the SW Plume area.
- Mobilize for Southwest Plumes remedial action and finish remedial action.
- C-Sparge is assumed to be the method of choice for treatment of the dissolved-phase component of the Southwest Plume. The remedial action is expected to include the installation of three C-Sparge treatment wells near the former permeable treatment zone (PTZ) study area. Operations and maintenance and systems monitoring of the remedial measures will begin after completion of construction. C-Sparge operation is assumed to be one year, but may take longer since the C-Sparge system utilizes the passing of the contaminated groundwater through the system to oxidize the volatile contaminants and capture the Tc-99. It is assumed the C-Sparge units are designed for continuous unmanned operation that will only require periodic routine surveillance and maintenance. The routine maintenance will include the exchanging of ion exchange resin cartridges in the units to allow the removal of Tc-99 to continue.
- Waste management activities associated with this subproject will include handling nonhazardous and RCRA-listed waste. With the exception of areas around suspected contaminant sources, the UCRS is expected to be free of RCRA-listed compounds and investigation-derived waste from the UCRS will be considered to be nonhazardous. Nonhazardous waste will be disposed of at an on-site sanitary landfill. Soils in suspected source areas and from the RGA are assumed to be RCRA-listed due to the presence of the TCE. RCRA-listed wastes either will be directly disposed of at Energy*Solutions* or will be thermally treated to reduce TCE concentrations to required limits and

then disposed of at Energy*Solutions*. Alternatively, the soils will be tested and de-listed if RCRA contaminants are not present. De-listed materials will be handled and disposed as nonhazardous waste.

The method(s) used for determining earned value for this WBS element is Actual Unit Completion.

Before beginning fieldwork, the project team must have an internal field review (IFR). For this IFR, the project team will put together a work package. This work package includes the following:

- Work instructions – includes hold points
- Training matrix and evidence of training
- UCD/USQD
- Lessons Learned
- Work authorization and work release from facility managers
- Procedures
- AHA
- Excavation/Penetration Permits
- RWP
- Team Meeting documentation
- Project Organizational Chart

In addition to the above, a Sampling Analysis Plan (SAP), Quality Assurance Plan (QAP), Waste Management Plan (WMP), and Health and Safety Plan (H&S) may be needed for any non-CERCLA actions.

For CERCLA actions, the appropriate FFA/CERCLA documentation will be required which will include SAP, QAP, WMP, H&S Plan, and other documents, as applicable to the action. These documents may require regulatory approval.

The work package and other documentation are developed by personnel that charge to this project and also by personnel that charge to project support service center (i.e., QAP and RWP).

**WBS 04.11.10.03.03 Remedial Action Completion Report**

The remedial action completion report documents the completion of construction and the start of operation of the selected measure. It further identifies to the degree possible the time frame of operations that is expected to meet the necessary cleanup objectives.

The versions of the report expected for development include the following:

- Complete D0, D1, and D2 Remedial Action Completion Report.

The method(s) used for determining earned value for this WBS element is Percent Complete.

**WBS 04.11.10.03.05 Remedial Design Report**

The draft 30% and 60% Remedial Design Report will be developed and submitted for internal review, then issued to DOE for review and approval. Comments from DOE will be incorporated, and a draft 90% Remedial Design Report will be submitted to the regulators for review and comment. A final CFC Remedial Design Report will be submitted for review and approval.

The method(s) used for determining earned value for this WBS element is Percent Complete.

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**WBS 04.11.10.03.06 Remedial Action Work Plan**

The draft D0 Remedial Action Work Plan (RAWP) will be developed and submitted for internal review, then issued to DOE for review and approval. Comments from DOE will be incorporated and a final draft D1 RAWP will be submitted to the regulators for review and comment. After receiving comments from the regulators a final D2 RAWP will be submitted for review and approval.

The method(s) used for determining earned value for this WBS element is Percent Complete.

**WBS 04.11.10.03.07 Feasibility Study**

Comments from DOE on the final D2 Feasibility Study will be incorporated. The final D2 Feasibility study will be submitted to the regulators for review and approval.

The method(s) used for determining earned value for this WBS element is Percent Complete.

**WBS 04.11.10.03.08 Proposed Plan**

Comments from DOE on the draft D1 Proposed Plan will be incorporated. The final draft D1 Proposed Plan will then be submitted to the regulators for review. After receiving comments from the regulators, a final D2 Proposed Plan will be submitted for review and approval.

The method(s) used for determining earned value for this WBS element is Percent Complete.

**WBS 04.11.10.03.09 Record of Decision**

The draft D0 Record of Decision (ROD) will be developed and submitted for internal review, then issued to DOE for review and approval. Comments from DOE will be incorporated and a final draft D1 ROD will be submitted to the regulators for review and comment. After receiving comments from the regulators a final D2 ROD will be submitted for review and approval.

The method(s) used for determining earned value for this WBS element is Percent Complete.

**WBS 04.11.10.03.10 Remedial Design Work Plan**

The draft D0 Remedial Design Work Plan (RDWP) will be developed and submitted for internal review, then issued to DOE for review and approval. Comments from DOE will be incorporated and a final draft D1 RDWP will be submitted to the regulators for review and comment. After receiving comments from the regulators a final D2 RDWP will be submitted for review and approval.

The method(s) used for determining earned value for this WBS element is Percent Complete.

**DELIVERABLES**

**WBS 04.11.10.03.01 Southwest Plume Subproject Management**

Element Milestones:

- None

Element Deliverables:

- Paducah Contractor Quality Assurance (QA) Project Plan

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- Paducah Contractor ES&H Plan
- Provide input to the following reports and submittals (if applicable):
  - Monthly Project Performance Report
  - Risk Management Plan Updates
  - Site Management Plan (SMP)
  - Semiannual Critical Analysis Report
  - Presentations
  - Federal Facility Agreement (FFA) briefings
  - Labor Standards Determinations
  - Gold Chart Performance Metrics
  - Annual updates to Site Treatment Plan
  - Annual Compliance Agreement Report
  - Annual ISMS Update
  - Annual Work Smart Standards Update
  - Financial Reporting, Management Analysis Reporting System
  - Annual Statement of Costs Incurred and Claimed
  - FFA Semiannual Progress Report
  - Remedial Action/Regulatory Commitment Tracking Report
  - Other reports/documents, as necessary

**WBS 04.11.10.03.02 C-Sparge Remedial Action**

Element Milestones:

- C-Sparge Remedial Action Start Fieldwork

Element Deliverables:

- Complete Waste Disposal

**WBS 04.11.10.03.03 Remedial Action Completion Report**

Element Milestones:

- Approval of the D2 Remedial Action Completion Report

Element Deliverables:

- Remedial Action Completion Report D0, D1, and D2 versions

**WBS 04.11.10.03.05 Remedial Design Report**

Element Milestones:

- Approval of the D2 Remedial Design Report

Element Deliverables:

- Southwest Plume RDR D0, D1 and D2 versions

**WBS 04.11.10.03.06 Remedial Action Work Plan**

Element Milestones:

- Approval of the D2 Remedial Action Work Plan

Element Deliverables:

- Southwest Plume RAWP D0, D1 and D2 versions

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**WBS 04.11.10.03.07 Feasibility Study**

Element Milestones:

- Approval of the D2 Feasibility Study

Element Deliverables:

- Southwest Plume Feasibility Study D2 version

**WBS 04.11.10.03.08 Proposed Plan**

Element Milestones:

- Approval of the D2 Proposed Plan

Element Deliverables:

- Southwest Plume Proposed Plan D1 and D2 versions

**WBS 04.11.10.03.09 Record of Decision**

Element Milestones:

- Approval of the D2 Record of Decision

Element Deliverables:

- Southwest Plume ROD D0, D1 and D2 versions

**WBS 04.11.10.03.10 Remedial Design Work Plan**

Element Milestones:

- Approval of the D2 Remedial Design Work Plan

Element Deliverables:

- Southwest Plume RDWP D0, D1 and D2 versions

**REQUIREMENTS**

- CERCLA/National Contingency Plan
- KY Hazardous Waste Permit (KY8-890-008-982)
- FFA for the PGDP
- SMP for the PGDP (annual revisions)
- Applicable state and federal laws and regulations (applicable or relevant and appropriate requirements)
- Contractor ISMS
- UEO-1066, as updated, Lease Agreement between DOE and USEC, Revision 4, dated October 30, 2001
- Enclosure to GDP 95-0018, as updated, USEC and DOE Resolution of Shared Site Issues, Revision 1, dated March 30, 1998
- Applicable contractor plans, policies, and procedures.
- Waste acceptance criteria (WAC) for all applicable treatment and disposal facilities that were in effect on April 24, 2006
- Applicable DOE Orders
- Applicable Federal Acquisition Regulations

It is the core value of the Contractor that the safety and health of every worker, the public at large, and our environment are the most important assets that we are entrusted to protect. To accomplish

this, an ISMS, based on DOE's ISMS, has been implemented that incorporates the five core functions and is based on the seven guiding principles. The objective of ISMS is to systematically integrate safety and environmental protection into the planning and execution of all work activities. The term safety encompasses Nuclear Safety, Industrial Safety, Industrial Hygiene, Occupational Health, Health Physics, and environmental issues. ISMS requirements flow down to Contractor subcontractors. The five core functions are (1) define the scope of work, (2) analyze hazards, (3) develop and implement hazard controls, (4) perform work within controls, and (5) provide feedback and continuous improvement. The seven guiding principles are (1) line management responsibility for safety, (2) clear roles and responsibilities, (3) competence commensurate with responsibility, (4) balanced priorities, (5) identification of safety standards and requirements, (6) hazard control tailored to work being performed, and (7) operations authorization.

Before a subproject begins, several activities must be completed that demonstrate that all involved in the project have completed rigorous health and safety reviews and that all potential hazards of doing the work have been identified. The routine activities in remedial actions are conducted in accordance with standard operating procedures, activity hazard analyses, and Integrated Safety Management plans. Nonroutine work will require a readiness assessment, as necessary, to ensure complete health, safety, and environmental reviews prior to work start. This assessment is conducted by people experienced in similar kinds of work with the right to examine all aspects of a project about to commence and requires that the project team provide documented evidence that any applicable requirements of the job have been met.

**SCOPE ASSUMPTIONS**

- The primary driver is the RCRA/CERCLA process outlined by the FFA and SMP for PGDP.
- DOE funding will be available to perform the defined scope of work.
- EPA and KY will adhere to review times set forth in the FFA.
- All D2 documents will be approved as submitted; therefore, development of a D3 document will not be required. Major changes will not be required to any document as a result of reviewer comments. Major changes include, but are not limited to, complete section or chapter rewrites; the addition of new sections or chapters; complete figure, table or map modifications; the addition of new figures, tables, or maps; changes to scientific modeling input parameters; and the use of scientific models other than those agreed upon in the work plans or Feasibility Studies.
- No Notices of Violation will be issued against this activity.
- No more than two audits per year will occur during the duration of the scope outlined within this baseline.
- Unexpected contaminants will not be encountered. Contaminants of concern include TCE and its degradation products, *cis* 1,2-dichoroethene, vinyl chloride, and Tc-99.
- The baseline remedy for the Southwest Plume does not include additional feasibility studies.
- All remedial actions will meet the requirements of CERCLA and the Secretarial Policy for addressing National Environmental Policy Act values as provided in the GWOU ROD.
- Assume three C-Sparge Treatment wells located in the area of the former PTZ study.
- Assume patents for utilizing C-Sparge Treatment systems can be negotiated without extreme negotiation and costs.
- Assume installation of four well clusters of 3 wells each (12 wells total) to supplement existing multiport wells. Well depth is 117 ft.
- Assume one control unit and ozone generator is adequate to run all three wells.
- Geochemical sampling includes a baseline sample round and quarterly sampling for one year. A total of 43 samples per round (excluding quality control (QC) samples) will be collected and analyzed for metals, radionuclides, anions (alkalinity, chloride, sulfate, nitrate, fluoride), and field

parameters (pH, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity).

- Startup sampling and analysis includes collection of quick turn around times (TATs) for volatile organic compounds (VOCs) and field parameters at the three C-Sparge wells on a weekly basis for the first month of operation. TAT is assumed to be seven days for VOCs.
- Operational sampling is assumed to be monthly sampling for VOCs, Tc-99, and field parameters for one year of operation. Startup is assumed to require two sampling technicians, a site superintendent, and a health and safety officer full time for a month. A subject matter expert (SME) (P4) is assumed half-time for the month and a project manager also is assumed one-quarter time.
- After startup, it is assumed that two technicians and one system operator would be half-time for the remainder of the first year. The SME would be 1/4 time (40 hrs/mo) and the PM would be 16 hrs/mo.
- It is assumed that reporting would be similar to the Northeast/Northwest Plume extraction system reports (quarterly data summary and an annual report)
- After the year of operation, the two technicians and system operator would drop to 1/4 time and the SME would drop to 20 hrs/mo, while the PM would remain at 16 hrs/mo.
- Assume 35% of waste will go to the C-746-U Landfill and 65% will go to Energy*Solutions*.
- Waste shipments to Energy*Solutions* are assumed to be by truck. Each truck is assumed to hold 60 drums.

**COMPLETION CRITERIA**

**WBS 04.11.10.03.01 Southwest Plume Subproject Management**

- Completion of all technical and reporting requirements for the conduct and reporting of the remedial action.

**WBS 04.11.10.03.02 C-Sparge Remedial Action**

- Completion of the remedial action requirements as defined by the Remedial Action Work Plan.

**WBS 04.11.10.03.03 Remedial Action Completion Report**

- EPA/KY approval of the Remedial Action Completion Report.

**WBS 04.11.10.03.05 Remedial Design Report**

- EPA/KY approval of the D2 Remedial Design Report.

**WBS 04.11.10.03.06 Remedial Action Work Plan**

- EPA/KY approval of the D2 Remedial Action Work Plan.

**WBS 04.11.10.03.07 Feasibility Study**

- EPA/KY approval of the D2 Feasibility Study.

**WBS 04.11.10.03.08 Proposed Plan**

- EPA/KY approval of the D2 Proposed Plan

**WBS 04.11.10.03.09 Record of Decision**

- EPA/KY approval of the D2 Record of Decision.

**WBS 04.11.10.03.10 Remedial Design Work Plan**

- EPA/KY approval of the D2 Remedial Design Work Plan.

**RISK MANAGEMENT**

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See Risk Management Plan for analysis.

Risk was mitigated through the following efforts:

- Continue to perform due diligence in all work activities to reduce the possibility of safety incidents.
- Perform due diligence to ensure that waste is properly packaged and that transportation conveyances are properly loaded.
- Follow waste characterization, packaging, transportation, and disposition procedures and plans.
- Ensure that documents are written professionally and accurately.
- Ensure that fieldwork is carried out safely and in accordance with work instructions.
- DQOs will have qualitative and quantitative statements derived from the DQO Process that clarify study objectives, define the appropriate type of data, and specify the tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions and process knowledge.
- Ensure QA/QC procedures address potential system and equipment failures.
- Subcontractor will follow ALARA principles and approved decontamination procedures.
- Ensure engineering design planning and review processes meet or exceed a design's intent for implementation.

**CERCLA AREAS AND SWMU**

| SWMU No. | Description |
|---|---|
| 1 | C-747-C Oil Land Farm |
| 211 | C-720 TCE Spill Site Northwest |
| 209 | C-720 Compressor Shop Pit Sump |
| 210 | Southwest Groundwater Plume |

**BASIS OF ESTIMATE**

**1. Summary of Site Conditions**

All decision documents and work plans will be approved to begin construction of the C-Sparge Treatment System.

**2. Estimating Methods**

☐ Parametric ☐ Bottom-Up ☒ Other: Parametric & Bottom-Up

**3. Sources of Estimating**

Labor – Technical review of documents to be prepared determined the mix of labor required for document preparation. Echols & R.S. Means were used to determine craft types to be used for construction-type activities. Project team meetings were utilized to identify staff types to be used for other areas, such as sample collection and analysis, waste characterization and disposal, health and safety monitoring, etc.

Equipment – Echols & R.S. Means were two printed sources used to determine the types of equipment needed to conduct the work proposed. Experience from technical staff also provided input as to the type of equipment needed.

Materials – Same as equipment.

Other Direct Cost – Same as equipment.

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Transportation – Same as equipment.

Subcontracts – Experience from technical staff provided requirements for the involvement of subcontracts.

**4. Basis of Estimate (Unescalated Values)**
See Detail Estimate.

**WASTE VOLUMES**

See attached waste performance metrics, as applicable.

**PROJECT SCHEDULE**

See attached schedule.

**BASELINE BY YEAR**

See attached Baseline by Year Report.